

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Docket No: Q79257

Katsuki KUSUNOKI

Appln. No.: 10/581,335

Group Art Unit: 2829

Confirmation No.: 6238

Examiner: Shantanu Pathak

Filed: December 14, 2006

For: METHOD FOR PRODUCTION OF SEMICONDUCTOR CHIP, AND
SEMICONDUCTOR CHIP

PRE-APPEAL BRIEF REQUEST FOR REVIEW

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Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

Pursuant to the Pre-Appeal Brief Conference Pilot Program, and further to the Examiner's Final Office Action dated December 10, 2009, Appellants file this Pre-Appeal Brief Request for Review. The Request is also accompanied by the filing of a Notice of Appeal and a Petition for Extension of Time.

Appellants turn now to the rejections at issue:

(1) Claims 1, 3-7, and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 10125958 to Shuji et al. ("Shuji") in view of U.S. Patent 4,604,161 to Araghi ("Araghi").

The Examiner cited Shuji as teaching a method for the production of gallium nitride compound semiconductor chips from a wafer having gallium nitride compound semiconductor layers laminated on a principal surface of a substrate formed of hexagonal crystal as claimed,

except that the Examiner recognized that Shuji teaches forming second grooves at a position conforming to the central lines of the first grooves rather than the claimed step of forming second grooves. The Examiner cited Araghi as teaching second grooves of a wafer at positions not conforming to the central lines of the first grooves. The asserted reason for combining the teachings was “to provide chips having precisely controlled ends and line edges for butting against the ends of like arrays.”

(i) The rejection should be withdrawn because the Examiner has not considered Shuji in its entirety, including the disclosure that teaches away from the suggested modification.

Shuji criticizes, discredits, or discourages slanting fracture lines and thereby teaches away from the suggested modification with the non-conforming grooves of Araghi. Viewed in its entirety, Shuji teaches division into pieces of a chip shape along positions where the center lines of the first grooves conform to the center lines of the second grooves, *i.e.*, vertical division, as shown by a broken line “a” (Fig. 1). Shuji teaches the corresponding undesirability of oblique breakage, as shown by a broken lines “b” and “c” (Fig. 1; [0010]). To avoid or minimize the effects of the undesirable breakage, Shuji teaches a width W1 ([0007]), polishing to thin the substrate ([0010]), and deepening the second groove (Fig. 2; [0011]). That is, as a whole, Shuji promotes vertical breakage and avoids oblique breakage.

In response, the Examiner asserted that “Shuji cannot teach away from a feature it does not mention” in the Actions of June 24, 2009 and April 21, 2010. However, Shuji plainly discloses—and plainly discourages—oblique breakage. The Examiner recognizes such teaching away in the Action of April 21, 2010: “Lines ‘b’ and ‘c’ are...*undesirable consequences of*

cracking and chipping that Shuji intends to correct” (page 2, emphasis added). Shuji teaches away from the recognized *undesirable consequences* and teaches away from the oblique fracture lines of Araghi.

The Examiner rightly noted that Shuji does not teach non-conforming grooves, but in responding to Appellants’ argument, the Examiner failed to consider Shuji *in its entirety* for its teaching away from the oblique fracture lines that would result from the suggested modification with Araghi.

(ii) The rejection should be withdrawn because the Examiner has not considered Shuji in its entirety, and Araghi in its entirety, for the technical disclosure as would be understood by a skilled artisan.

A skilled artisan would not have applied the cutting method of Araghi to the substrate of Shuji. Shuji teaches that, in cutting the sapphire substrate, the wafer is divided along lines such as “a”, “b”, or “c” illustrated in Fig. 1, and thereby it is impossible to control the angle of oblique division. From a technical perspective, this is because the wafer of Shuji is a nitride semiconductor laminated on a sapphire substrate and does not possess cleavability because of the characteristic hexagonal system of the single crystal structure of the substrate ([0005]). In other words, according to Shuji, the sapphire substrate does not have cleavability and therefore it is impossible to control the angle of division.

In contrast, the cutting method of Araghi relies on the particular cleavability of the silicon wafer. Silicon is cleaved easily along the (111) plane, and a silicon substrate having a (100)

plane is linearly cleaved precisely at an angle of 54.7 degrees to thereby form a smooth (111) plane. The method of Araghi depends on such technical characteristics of silicon.

Therefore it is impossible to cut a sapphire substrate by utilizing the feature of cleavability disclosed in Araghi, which the sapphire substrate of Shuji does not intrinsically have. A skilled artisan would readily appreciate the technical differences between the properties of the silicon substrate taught by Araghi and those of the sapphire substrate taught by Shuji. Accordingly, a skilled artisan would not have modified the references as suggested by the Examiner.

In response, the Examiner asserted only that “specific fracture planes are dependent on the sapphire material, which is taught by Shuji” (Action of June 24, 2009, page 3). The Examiner has provided no support for such assertion, and, as shown above, the sapphire substrate of Shuji does not have cleavability along specific fracture planes.

In further response, the Examiner asserted that Shuji is “directed to the purposeful cleaving of the sapphire substrate along line ‘a’, thereby forming a vertical line of division (i.e. ~90°)” (Action of April 21, 2010, page 3, emphasis original). The Examiner concluded that “Shuji does not teach that it is impossible to control” the angle of division. However, Fig. 1 plainly supports (in lines “b” and “c”) the technical fact that the sapphire substrate does not have cleavability. The desire of Shuji to promote only vertical breakage does not change the inherent characteristic of the disclosed sapphire substrate. Rather, the impossibility of cleaving along a (111) plane, or any other specific fracture plane, in the sapphire substrate is corroborated by the recognized problem of the prior art and the solution proposed by Shuji.

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Accordingly, the Examiner has not considered Shuji in its entirety, and Araghi in its entirety, for the technical disclosures as would be understood by a skilled artisan.

(2) Claim 2 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Shuji in view of Araghi, and further in view of U.S. Patent Application Publication 2002/0014681 A1 to Tsuda et al. ("Tsuda") and U.S. Patent Application Publication 2002/0105986 A1 to Yamasaki et al. ("Yamasaki"). Claims 1, 8-10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Shuji in view of Araghi, and further in view of U.S. Patent Application Publication 2001/0038655 A1 to Tanaka et al.

Appellants rely on the response above with respect to the rejection of claims 1, 3-7, and 11 over Shuji and Araghi. Namely, the Examiner has not considered the disclosure of Shuji that teaches away from the suggested modification, and the Examiner has not considered the references for the technical disclosures as would be understood by a skilled artisan.

Appellants therefore respectfully request withdrawal of the final rejection upon review by the Pre-Appeal Panel.

Respectfully submitted,

/Jerrick Ho/

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

Jerrick J. Ho
Registration No. 63,763

WASHINGTON OFFICE
23373
CUSTOMER NUMBER

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